

Clarity 3D Solver

True 3D electromagnetic field solving for PCB and IC package designs

The Cadence® Clarity™ 3D Solver is a 3D full-wave electromagnetic (EM) simulation software tool for designing critical interconnects for PCBs, IC packages, and system on IC (SoIC) designs. The Clarity 3D Solver’s breakthrough EM simulation technology lets you tackle the most complex electromagnetic (EM) challenges when designing systems for 5G, automotive, high-performance computing (HPC), and machine learning applications with gold-standard accuracy that allows you to signoff and successfully bring your system to the manufacturing process.

Industry-leading Cadence distributed multiprocessing technology enables the Clarity 3D Solver to deliver the virtually unlimited capacity and 10X speed required to efficiently and effectively address these larger and more complex structures for both cloud and on-premises distributed computing. It creates highly accurate S-parameter models for use in signal integrity (SI), power integrity (PI), and electromagnetic compliance (EMC) analysis, enabling simulation results that match lab measurement, even at 112Gbps+ data-transfer speeds. The Clarity 3D Solver can solve the true 3D structure without having to manually reduce the size of the structures being modeled.

Save Design Time with Parallelization

Historically, large structures have been manually cut up into smaller structures for analysis using the largest and most powerful computing resources. No more. We designed the Clarity 3D Solver from the ground up to take advantage of your multi-core compute resources by parallelizing the mathematical tasks required to solve for 3D structures. The tasks can be parallelized within one computer’s cores

IC PKG Test Cases	CPU Cores	Clarity	Legacy	Performance Gain	Clarity Memory Requirement	Clarity Memory Reduction
Flipchip PDN	32	4h	41.6h	10.4X	42GB	84%

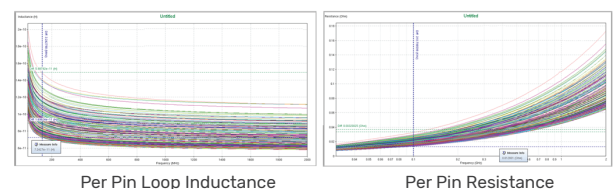
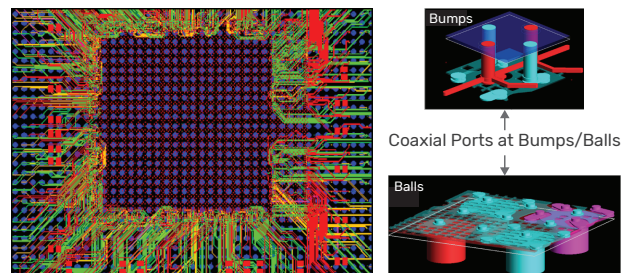


Figure 1: Model the entire package PDN in just half a day compared to multiple days using a legacy 3D solver

or across multiple computers, cutting the time to solve for complex structures by 10X and even more.

Industry-leading parallelization technology ensures that both meshing and frequency sweeping can be partitioned and parallelized across as many computers, computer configurations, and cores as are available. The amount of time required to solve is scalable based on the number of computer cores. If a user can double the number of computer cores, the performance will be nearly doubled as well.

Cost Savings Solving for 3D Structures with Cloud Infrastructure

Using web-based cloud servers to solve 3D structures can be an alternative to purchasing computing hardware. Instead of choosing large and costly servers, designers using the Clarity 3D Solver can select lower cost cloud-computing resources and still maintain the highest performance. This flexibility can produce considerable savings on the cost of cloud computing expenses when solving for 3D structures.

Complete Design and Analysis Flow

The Clarity 3D Solver is a key component in the Intelligent System Design™ methodology required by advanced electronic product design teams. With a complete design and analysis flow from Cadence, you will be empowered to create reliable and competitive products, deliver on time and on budget, and increase your market share.

Benefits

- ▶ Avoid costly implementations, engineering delays, product iterations, and field failures
- ▶ Remove late-stage design iterations by accurately predicting how a product will perform in the lab
- ▶ Improve efficiency and communication between design and analysis teams
- ▶ Provide integrated model extraction capabilities for chip, package, and PCB
- ▶ Accelerate product development with complex 3D structure modeling with near-linear scalability in speed enhancement and memory reduction
- ▶ Improve product reliability with fast and accurate interconnect extraction
- ▶ Avoid design re-spins by identifying problems early in the design cycle
- ▶ Improve product design with what-if analysis utilizing Cadence Sigrity™ 3D Workbench's parameterization and user-defined equation expressions to easily edit, modify, and optimize mechanical structures

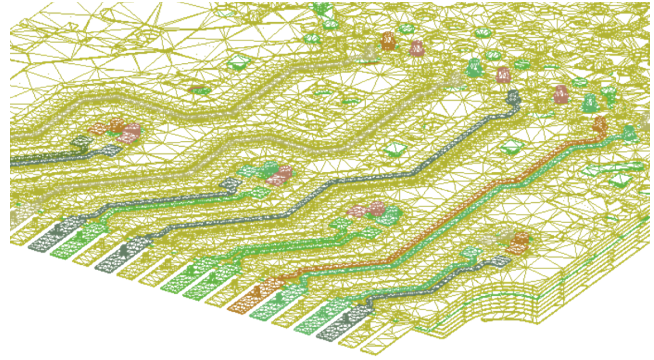


Figure 2: Adaptive meshing quickly and efficiently ensures accurate modeling across a large frequency range

Features

Enhanced usability

- ▶ Automatically matches computing resources available to the structure being solved, so 3D experts and non-3D experts can get accurate results in a timely manner.

Breakthrough parallelization

- ▶ Allows engineering managers more flexibility when budgeting for computer configurations required for 3D simulation.

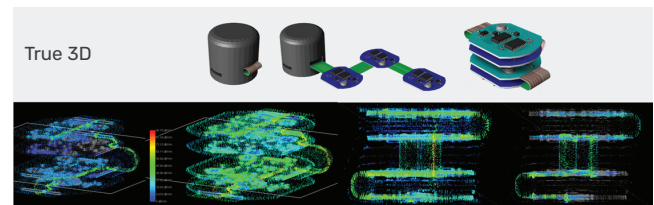


Figure 3: Model rigid-flex designs including all the folds and bends

Flexibility

- ▶ Brings true 3D analysis to any engineer with either desktop, on-premises, or cloud HPC resources.

Maximizing resources

- ▶ Eliminates early termination due to computer resources being fully consumed if only a small number of cores is available.

Available to users of all design platforms

- ▶ Easily reads design data from all standard chip, IC package, and PCB platforms.

Integrated 3D solutions

- ▶ Easily integrates with Cadence’s Allegro® Package Designer Plus SiP Layout Option and Virtuoso® and Allegro platforms to optimize in the analysis tool and implement in the design tool without being redrawn.

Model EM interface

- ▶ Merges mechanical structures such as cables and connectors with their system design and models an EM interface as a single model.

Sigrity 3D workbench

- ▶ Incorporates a 3D mechanical CAD GUI for creating, editing, and importing 3D solid models for electrical analysis. You can bring in design data from popular MCAD formats such as ACIS, IGES, and STEP as well as Cadence Allegro and Sigrity formats. 3D components are easily created with parameterization and equation expressions to allow for modeling flexibility and simulation optimization. 3D CAD geometry problems and misalignment errors can be quickly repaired with 3D Workbench’s model clean-up functions. The advanced adaptive meshing algorithms allow you to automatically generate accurate meshes for small intricate 3D components to large complex electronic systems with enclosures.

Operating Systems and Interface Databases

- ▶ Works with Microsoft Windows and Linux.
- ▶ Interfaces to PCB and IC package layout databases from Cadence, Mentor Graphics, Altium, Zuken, and AutoCAD.

Cadence Services and Support

- ▶ Cadence application engineers can answer your technical questions by telephone, email, or internet. They can also provide technical assistance and custom training.
- ▶ Cadence-certified instructors teach more than 70 courses and bring their real-world experience into the classroom.
- ▶ More than 25 Internet Learning Series (iLS) online courses allow you the flexibility of training at your own computer via the internet.

IC PKG Test Cases	CPU Cores	Clarity	Legacy	Performance Gain	Clarity Memory Requirement	Clarity Memory Reduction
64 signals across 8 packages and 1 PCB	128	28h	Can't solve	N/A	32GB	N/A

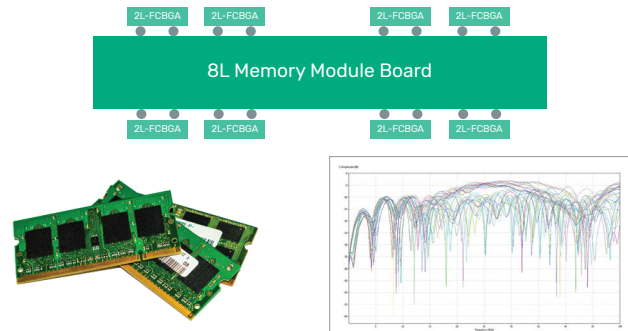


Figure 4: Signals traveling across multiple packages are modeled with their PCB; problems this large were not solvable with legacy EM solvers

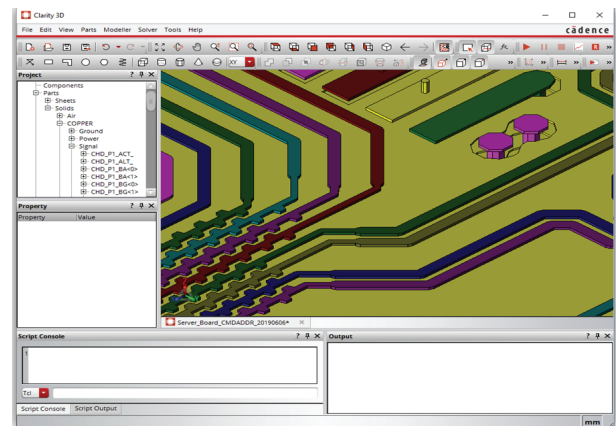


Figure 5: A 3D view of a tabbed routing example models with Clarity 3D Solver

- ▶ Cadence Online Support gives you 24x7 online access to a knowledgebase of the latest solutions, technical documentation, software downloads, and more.
- ▶ For more information, please visit www.cadence.com/support for support and www.cadence.com/training for training.